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1980c4

PEACE SITE C PROJECT

APPLICATION
for an
ENERGY PROJECT CERTIFICATE
SUPPLEMENTARY MATERIAL

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British Columbia Hydro and Power Authority

KWOC
1 - Hydro - British Columbia
2 - Peace Site
(SD)

AFFIDAVIT

101-03976/

IN THE MATTER of the Utilities Commission Act and of an application by British Columbia Hydro and Power Authority.

I, ERIC HENRY MARTIN, of 5769 Cranley Drive, West Vancouver, British Columbia, make oath and say as follows:

1. I am the Executive Vice-President, Operations, for the Applicant, British Columbia Hydro and Power Authority and as such am duly authorized to make this Affidavit and sign upon its behalf the material of British Columbia Hydro and Power Authority provided as Supplementary Material to an Energy Project Certificate Application under Section 18 of the Utilities Commission Act. A true copy of the Supplementary Material is attached hereto and marked Exhibit "A" to this my Affidavit.

2. The information contained in said Supplementary Material regarding British Columbia Hydro and Power Authority and the particulars of the Project is to the best of my knowledge and belief, true and accurate in all respects.

SWORN BEFORE ME at the City of Vancouver, in the Province of British Columbia, this 12th day of December 1980.

A Commissioner for taking Affidavits for the Province of British Columbia

ERIC HENRY MARTIN

PEACE SITE C PROJECT

APPLICATION
FOR AN
ENERGY PROJECT CERTIFICATE
SUPPLEMENTARY INFORMATION

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

This is Exhibit "A" referred to in the affidavit of Eric Humphreys Sworn to before me at the City of Vancouver in the Province of British Columbia on the 12th day of December 19 88.

A Commissioner for taking Affidavits for British Columbia

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

E. H. MARTIN
Executive Vice-President
Operations

970 BURRARD STREET
VANCOUVER, B. C.
V6Z 1Y3

11 December 1980

The Honourable R. H. McClelland,
Minister of Energy, Mines and
Petroleum Resources,
Parliament Buildings,
VICTORIA, B. C.
V8V 1X4

Dear Mr. McClelland:

Peace Site C Project
Application for an Energy Project Certificate

Thank you for your letter of 21 November 1980 outlining the additional information required to complete the application requirements under B.C. Regulation 388/80. In discussion with Mr. Denis O'Gorman, Chairman of the Energy Project Coordinating Committee, it was agreed that, as the Application submitted on 29 September 1980 has been widely distributed throughout the Province, together with the Environmental Impact Statement, the additional information requested in your letter would be provided as supplementary information in accordance with Section 1.(1)(e)(ii) of the Regulation, rather than as a revision of the original Application. It will be forwarded by B.C. Hydro to all those who have received the Application. Your letter of 21 November is attached herewith as Attachment No. 1, for the benefit of those who will receive this supplementary material.

Transmission Lines

The Application (on Page B-5), and the supporting documents, the Environmental Impact Statement and the Benefit-Cost Analysis, include the 500 kV transmission lines required to connect the Site C project to the provincial grid at Peace Canyon, and to strengthen the existing lines from Williston to Kelly Lake through the addition of a new 500 kV circuit. B.C. Hydro wishes to confirm that the 500 kV lines from Peace Site C to Peace Canyon should be considered as an integral part of the Site C Project, and that the additional 500 kV circuit from Williston Substation at Prince George to Kelly Lake be considered for certification at the same time.

The information requested in your letter on these two transmission lines is enclosed as Attachment No. 2.

Hon. R. H. McClelland 11 December 1980

Load Forecast Information

The more detailed summary which you requested outlining anticipated growth patterns by sales category and identifying key assumptions used in the forecast, is enclosed as Attachment No. 3, which also includes the results of the most recent load forecast. Table E-2 is an update of Table 2-3 in the Environmental Impact Statement.

Water License

In accordance with your direction, B.C. Hydro will apply separately for a Water License in accordance with the normal procedures under the Water Act. A copy of the Water License application will be forwarded to you.

Requested Documents

Forty copies of the original Application together with this supplementary information are enclosed as requested.

Hydro is prepared to provide additional copies of the reports contained in the "List of Documents" attached to your letter of 21 November, but some advance notice of the numbers required is essential as these reports have already been given very wide distribution, and additional copies may have to be printed.

Other
Disposition of Application

The information contained in your letter under the headings "Other" and "Disposition of Application", is noted and requires no comment.

We trust that the supplementary material contained herein meets your requirements and completes our application for an Energy Project Certificate for the Peace Site C Project and associated transmission.

Yours very truly,

E. H. Martin

Attachment No. 1

Province of
British Columbia
OFFICE OF THE MINISTER

Ministry of
Energy, Mines and
Petroleum Resources

Parliament Buildings
Victoria
British Columbia
V8V 1X4

DEC - 2 19

EXECUTIVE VICE-PRESIDENT OPERATIONS

FILE: 1240.8 SC

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	HME	
	RKK	
	WMW	

1980-11-21

Mr. Eric Martin,
Executive Vice-President, Operations,
B. C. Hydro and Power Authority,
970 Burrard Street,
Vancouver, B. C.
V6Z 1Y3

Dear Mr. Martin:

B. C. Hydro and Power Authority's application of September 19, 1980, for an Energy Project Certificate together with the Environmental Impact Statement for the Site C hydroelectric project have been received. To assist my colleague, the Honourable Minister of Environment, and I in our disposition of the Application under Section 19 of the Utilities Commission Act, a review of the application has been initiated. As your staff know, we have constituted an Energy Project Co-ordinating Committee chaired by the Energy Resources Branch to facilitate this work.

As a result of initial review of the application, the following items are necessary to complete the application requirements under B. C. Regulation 388/80.

Transmission Lines

The Utilities Commission Act requires certification of electric transmission lines of 500 kv or higher voltage. The September 29, 1980 covering letter and the project description on page B-1 of the application do not refer to the transmission lines identified on page B-5. As transmission lines are an integral part of the application, it is appropriate that (as defined in Part II, Section 18 of the Utilities Commission Act) these regulated projects be considered for certification at the same time as the proposed hydroelectric power plant. It is requested that both the covering letter and the application document be revised to:

1) include an application for the 500 kv transmission lines and provide a project description of all proposed transmission lines, as required under B. C. Regulation 388/80, Part I(b);

2) contain a summary statement on the previous review under the ELUC Guidelines for Linear Development and the resultant approval in principle of the Site One - Site C - Fort St. John Transmission line;

3) contain a map identifying the location of the 500 kv transmission lines and the ancillary lines described on page B-5 of the application, and

.../2

4) identify ancillary applications, as required under B. C. Regulation 388/80, Part I(d).

Load Forecast Information

Future loads on the B. C. Hydro system are discussed on pages C-3 to C-6 of the application and on pages 2-7 to 2-15 of the Environmental Impact Statement. A more detailed summary should be provided to outline anticipated growth patterns by sales category and to identify key assumptions used in the forecast. In addition, Table 2-3 in the Environmental Impact Statement should be updated.

Water Licence

It is requested that a water licence be applied for, in compliance with Water Act procedures. A copy of the Water Licence application and pertinent documents should also be submitted to the Director, Project Analysis Division, Energy Resources Branch at the time of application.

Requested Documents

Forty copies of the revised application should be submitted to the Director, Project Analysis Division, Ministry of Energy, Mines and Petroleum Resources.

I am aware that many of the documents listed on the attached sheet have been distributed for previous government review. Please be prepared, if necessary, to provide additional copies of these documents for our review purposes. In addition, copies of these documents may be needed by the Utilities Commission.

Other

For your information, exclusion of land from the Agricultural Land Reserve is required under Section 11(1) of the Agricultural Land Commission Act, RSBC Chapter 9, and not Section 9 (as specified on page D-1 of the application). Incidentally, Orders-in-Council are required under the Hydro and Power Authority Act, RSBC Chapter 188, and not the B. C. Hydro and Power Authority Act (as specified on page D-1 of the application).

Disposition of Application

With the concurrence of the Minister of Environment, I will refer the application to the Utilities Commission for public hearing, as provided under Section 19(1)(a) of the Utilities Commission Act. Terms of reference for this hearing will be announced publicly after the application requirements have been satisfied.

.../3

Please be advised that the information requests contained in this letter are based on our initial review of the application and do not preclude future requests. As you can appreciate, this letter does not imply endorsement of the application, or any supporting documents, by the British Columbia government and does not preclude government participation in any public hearing on the application.

I await receipt of the requested information to complete the application for project certification.

Yours very truly,

R. H. McClelland,
Minister.

Attachment.

cc: The Honourable Stephen Rogers,
Minister of Environment.

2 December 1980 - copies sent to:

Messrs. C.W.J. Boatman
W. D. Mitchell
L. E. Wight

LIST OF DOCUMENTS

B. C. Hydro & Power Authority, October, 1979. Peace River Site C Benefit-Cost Analysis. B. C. Hydro, System Engineering Division, Report No. SE 9711.

B. C. Hydro & Power Authority, February, 1980. Peace River Site C Mitigation and Compensation. B. C. Hydro Report No. 8006.

Blood, Donald A., 1979. Peace River Site C Hydroelectric Development, Environmental and Socio-economic Assessment: Wildlife Sub-Report.

Canadian Bio Resources Consultants Ltd., 1979. Peace River Site C Hydroelectric Development, Agriculture Assessment.

Canadian Bio Resources Consultants Ltd., 1979. Peace River Site C Hydroelectric Development, Environmental and Socio-economic Assessment: Water Quality and Use.

Canadian Resourcecon Ltd., 1979. Peace River Site C Hydroelectric Development, Environmental and Socio-economic Assessment: Resource Evaluation Study.

Canadian Resourcecon Ltd., Suzanne Veit and Associates Inc., Urban Programme Planners, and Sigma Engineering Ltd., 1979. Peace River Site C Hydroelectric Development, Environmental and Socio-economic Assessment: Socio-economic Impact Study.

Canadian Resourcecon Ltd., 1980. Peace River Site C Hydroelectric Development: Vegetable Industry Study.

Canadian Resourcecon Ltd., 1980. Peace River Site C Hydroelectric Development, Environmental and Socio-economic Assessment: Tourism Impact Study.

Edwin, Reid & Associates, 1979. Peace River Site C Hydroelectric Development, Recreation Impact Assessment.

Reid, Collins and Associates Ltd., 1979. Peace River Site C Hydroelectric Development, Environmental and Socio-economic Assessment: Forest Resource Assessment.

Renewable Resources Consulting Services Ltd., 1979. Peace River Site C Hydroelectric Development, Fish and Aquatic Environment.

Spurling, Brian E., 1978. The Site C Heritage Resource Inventory and Assessment.

Thurber Consultants Ltd., May, 1978. Site 1 - Site C - Fort St. John Transmission Development Environmental Impact Assessment.

Thurber Consultants Ltd., 1979. Peace River Site C Hydroelectric Development, General Land Use Studies.

Thurber Consultants Ltd., 1979. Peace River Site C Hydroelectric Development, Physical Environment Impact Assessment.

Attachment No. 2

PEACE CANYON - SITE C 500 kV TRANSMISSION LINE

SECTION B - PROJECT DESCRIPTION

B-I DESCRIPTION OF PROJECT, ITS PURPOSE AND COST

B-I-1 PURPOSE OF THE PROPOSED TRANSMISSION LINE

Two 500,000 volt (500 kV) three phase transmission circuits are required to transmit power generated at the proposed Site C hydro-electric project to the integrated B.C. Hydro electrical transmission system. These two circuits would run from Site C to the switchyard of the Peace Canyon Generating Station located about 80 km upstream on the Peace River.

Each of the two circuits would be capable of transmitting all the electrical power generated at Site C. Two circuits are provided to permit secure transmission of that power when either circuit is out of service for any reason.

B-I-2 PHYSICAL DESCRIPTION

The two transmission circuits will be located on a common right of way as shown on Figure 1. The dimensions of a typical tower that would be used on this line are shown on Figure 2. The two circuits shown on the attached route plan #800-T07-X96M, extend 76 km between Site C and Peace Canyon.

A 138 kV transmission line between G.M. Shrum Generating Station and Fort St. John substation will be completed on part of this right of way in 1982 to meet the increasing electrical power demand in the

Fort St. John area. When Site C is developed, Fort St. John will be connected to the Site C switchyard. The portion of 138 kV transmission line constructed on the right-of-way between Site C and Peace Canyon, will be removed and replaced by the second 500 kV line.

B-I-3 COST

The projected total cost of the 2 - 500 kV transmission lines and their terminal equipment at Peace Canyon is estimated to be $94.9 million including overhead, interest during construction and inflation, as detailed in Section B-I-7 of the Application.

B-II TIMETABLE

Figure 3 shows the proposed schedule for the two 500 kV transmission lines assuming an October 1987 in-service date for the first units at Site C.

B-III PUBLIC WORKS

No new public works or infrastructure will be required for this project.

B-IV ROUTE SELECTION AND ENVIRONMENTAL IMPACT ASSESSMENT STUDIES

Studies following the ELUC Guidelines for Linear Development were started in March 1977 by Thurber Consultants Ltd. who were retained to carry them out.

The Corridor Selection (Stage I) report was sent to the ELUC Secretariat for distribution to the government agencies as well as being distributed to local and central libraries and made available at the local and Vancouver Hydro offices. The results of the Stage 1 study were included in a widely distributed public information report.

The Environmental Impact Assessment (Stage II) report was completed in May 1978. After initial review by Hydro, the Stage II report was sent to the ELUC Secretariat for review by the government agencies. On completion of the review process, an approval in principle was received from ELUC in August 1979. A copy of the letter confirming the approval in principle is attached.

SECTION C - PROJECT JUSTIFICATION

C-I STUDIES OF THE TECHNICAL, ECONOMIC AND FINANCIAL FEASIBILITY

It is B.C. Hydro's practice to connect large generating stations to the grid with a minimum of two transmission lines so that the output of the plant is maintained upon loss of any one line in order that the generating plant capacity can be considered firm. This requires two lines out of Site C, each being capable of carrying the 900 MW rated output of the station. Studies have established that two 500 kV transmission lines, similar to the G.M. Shrum and Peace Canyon lines now in service, will be adequate to transmit the 900 MW and they will ensure that no instability will occur in the system due to electrical disturbances caused by lightning or mechanical failures such as a tower collapse. These studies also establish that the lines from Site C should be connected to the existing system at Peace Canyon generating station rather than at G.M. Shrum generating station.

The financial feasibility of the Site C project is determined on the basis of the total generation and transmission line costs which have been included in the project benefit-cost analysis.

SECTION D - ANCILLARY APPLICATIONS

D-I Approvals, Permits or Licences required under the Pollution Control Act and Water Act

These Acts do not apply to transmission lines.

D-II Other Approvals, Permits or Licences Required

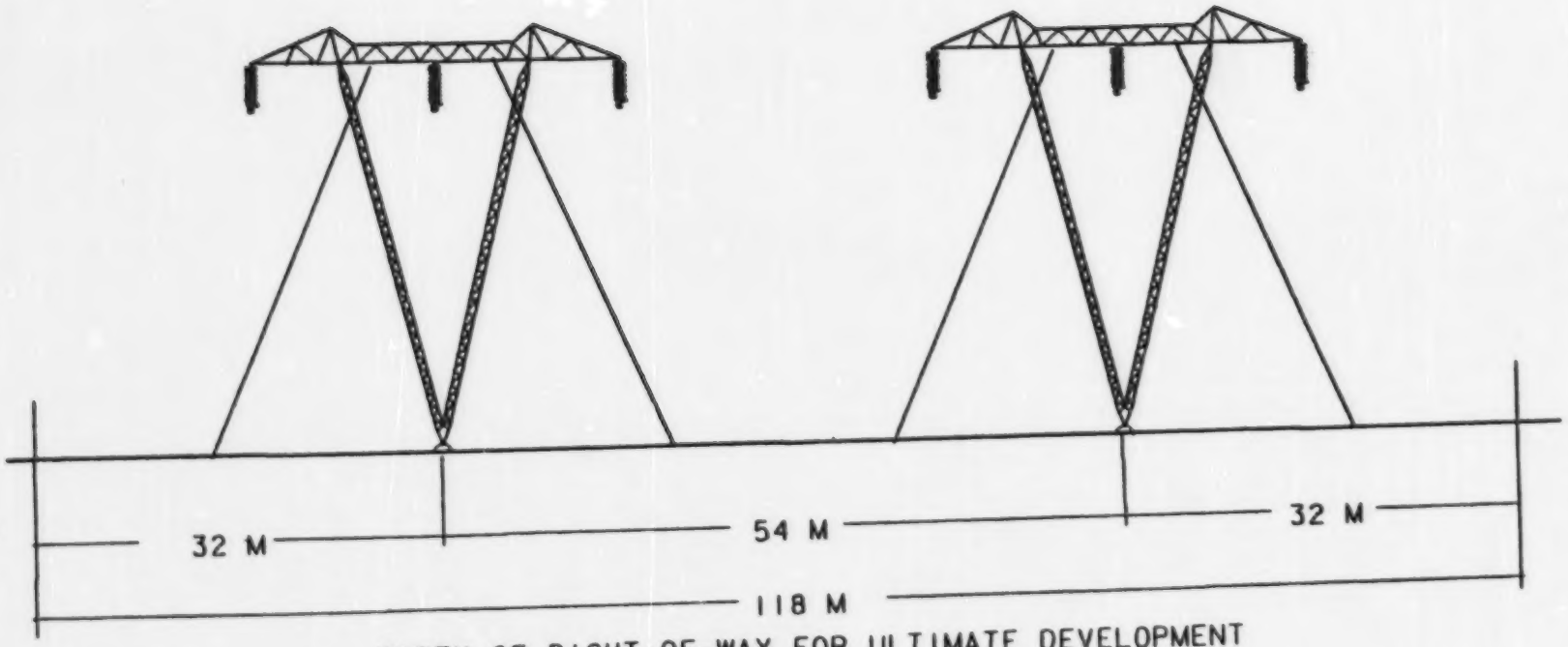
1. Necessary Orders-in-Council required under Section 21 of the B.C. Hydro and Power Authority Act for Land Acquisition.

2. Permits required under the Navigable Waters Protection Act for crossing over navigable waterways.

3. Licence to cut pursuant to the Forest Act is required prior to logging and clearing.

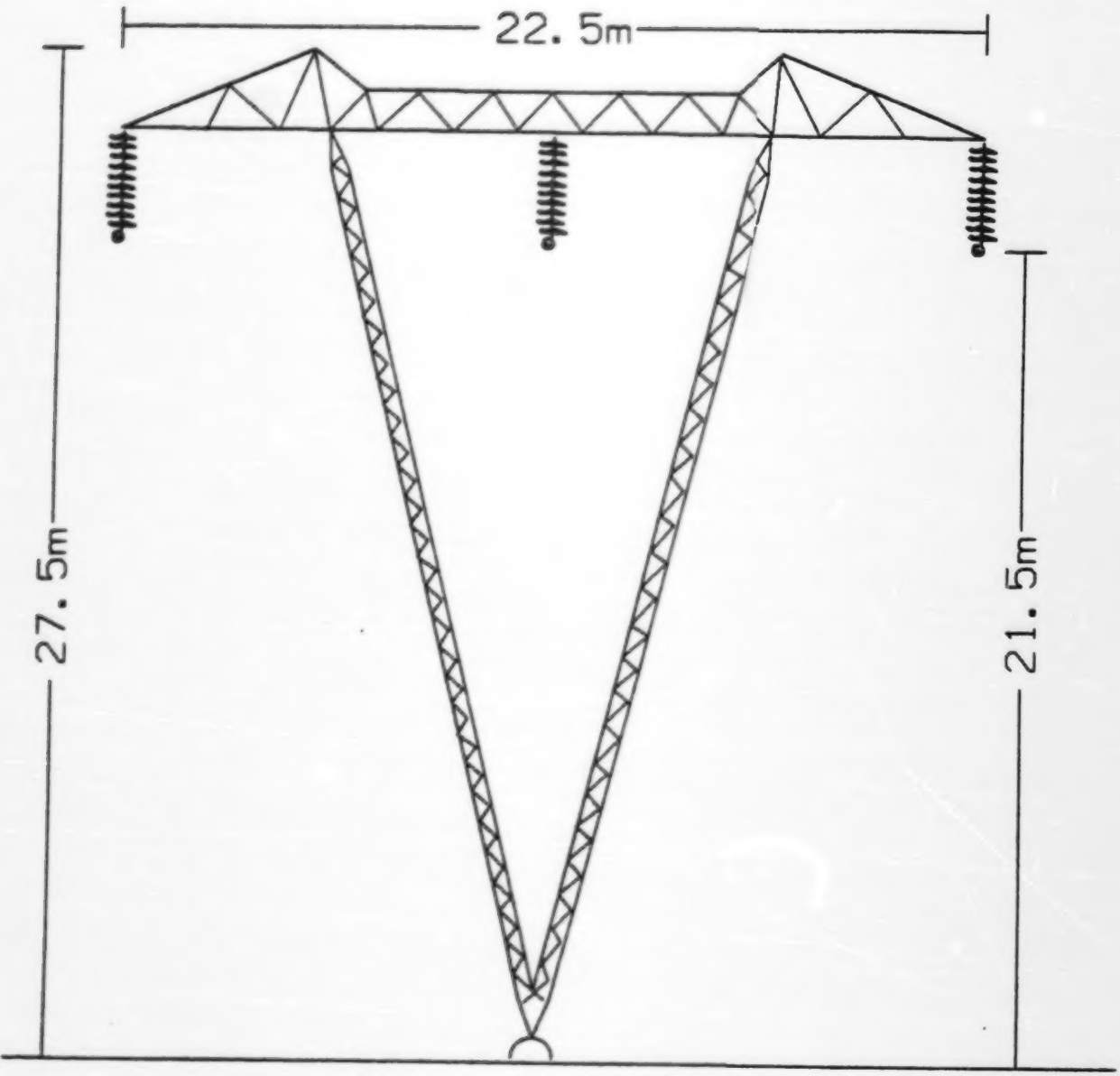
4. Conditional Use Authorization from the Agricultural Land Commission as required for crossing over lands designated Agricultural Land Reserve.

5. Other permits and approvals may be required by Contractors under the Pollution Control Act, Municipal Act, and municipal/regional regulations for work associated with the transmission line construction.



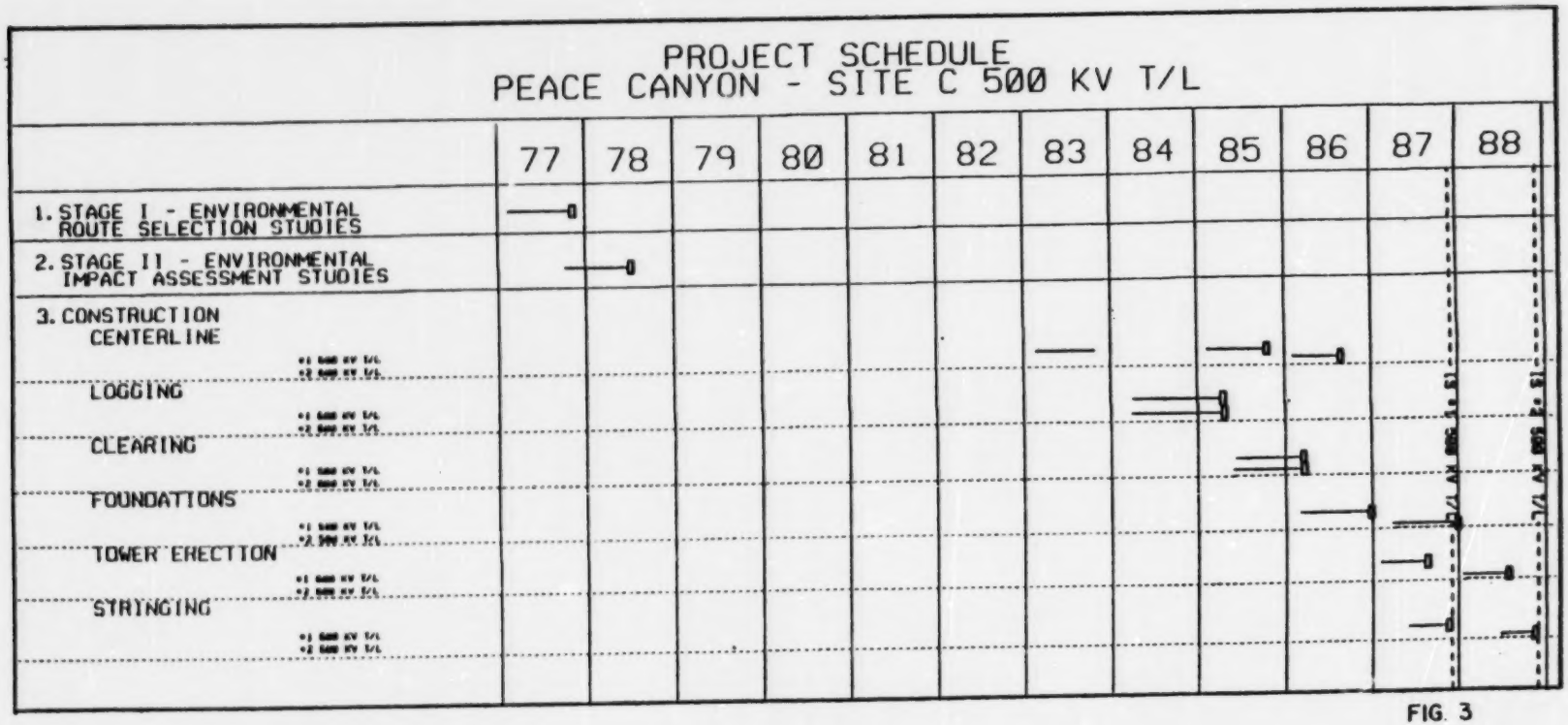
WIDTH OF RIGHT-OF-WAY FOR ULTIMATE DEVELOPMENT

FIG. 1



GUYED V TOWER

FIG. 2


PROJECT SCHEDULE
PEACE CANYON - SITE C 500 KV T/L
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78
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84
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86
87
88
1. STAGE I - ENVIRONMENTAL ROUTE SELECTION STUDIES
2. STAGE II - ENVIRONMENTAL IMPACT ASSESSMENT STUDIES
3. CONSTRUCTION
CENTERLINE
LOGGING
CLEARING
FOUNDATIONS
TOWER ERECTION
STRINGING

FIG. 3

Province of
British Columbia

Environment and
Land Use Committee

Parliament Buildings
Victoria
British Columbia
V8V 1X4
387-5660

1979 08 21

Mr. Steven Hayden
Manager
Transmission Planning Division
B.C. Hydro and Power Authority
Box 12121
555 West Hastings Street
VANCOUVER, B.C.
V6B 4T6

Dear Mr. Hayden:

RE: SITE ONE - SITE C - FORT ST. JOHN
B.C. HYDRO TRANSMISSION LINE

I am pleased to advise you that at a recent meeting of the Environment and Land Use Committee, approval-in-principle was granted for the environmental aspects of the above noted project.

This approval applies to the recommended corridor 1A as described in the Stage II report and is subject to the following conditions.

1. The immediate public release of all environmental and related technical reports prepared during the Stage II assessment.

2. That under the direction of the ELUC Secretariat and in cooperation with B.C. Hydro, a review is to be undertaken to examine the potential for a joint corridor to accommodate both the proposed transmission line and, if possible, westward extention of the British Columbia Railway to Hudson's Hope and possibly to the Carbon Creek coal properties.

I must advise that approval-in-principle for this proposed corridor does not imply any approval-in-principle of the proposed generation facility at site C, the latter being subject to a separate but related review process.

We look forward to continued cooperation on this proposal.

Yours truly,

Erik Karlsen

for Denis K. O'Gorman
Secretary

DKOG:BRG:sc1

WILLISTON-KELLY LAKE #3 500 kV TRANSMISSION LINE

SECTION B - PROJECT DESCRIPTION

B-I DESCRIPTION OF PROJECT, ITS PURPOSE AND COST

B-I-1 PURPOSE

Power from the Peace is currently transmitted through the three 500 kV transmission lines from the G.M. Shrum and Peace Canyon Generating Stations to Prince George. These lines are capable of carrying the additional 900 MW to be generated at the proposed Site C powerplant.

However, there are only two 500 kV lines to carry this power from the Williston Substation at Prince George south to Kelly Lake.

The planning studies conducted in the early 1970's to determine transmission line requirements for the Peace Canyon Project indicated that a third 500 kV circuit from the Peace River area south to Williston Substation at Prince George and from Williston south to Kelly Lake Substation near Clinton would be necessary to fully meet all planning criteria. The studies also indicated that, if a third line was constructed only as far as Williston Substation, it would be possible to defer a large expenditure of capital for a few years with only a small reduction in system reliability by using generation shedding for loss of either of the two existing Williston to Kelly Lake 500 kV lines. The decision was therefore made to defer construction of the third Williston-Kelly Lake circuit until such time as additional generating station development warranted it, or until experience with the existing system demonstrated the need for the increased reliability and reduction in losses the third line could provide. Site C would provide the additional generation which increases the desirability of a third line.

The third Williston-Kelly Lake line improves system reliability by increasing the stability margin and reducing the need for generator shed-

ding during disturbances. For the present system if a short circuit occurs on one of the existing two lines between Williston and Kelly Lake, the line will trip out causing a severe oscillation of the G.M. Shrum and Peace Canyon generators. Without the proposed third transmission line, the oscillation is so great that one or two generators must be disconnected immediately or instability of the system will occur. This would normally be unacceptable and is justified in this case by the fact that it will occur only for the most severe faults under heavy load transmission conditions. The addition of any further generation feeding into Williston would result in the system being unstable for a much wider range of system disturbances and reducing system reliability to an unacceptable level. The third line will also reduce losses and will conserve approximately 200 GWH of energy in 1986, a year when an energy shortage is forecast.

B-I-2 PROJECT DESCRIPTION

Power generated on the Peace River system at G.M. Shrum and Peace Canyon generating stations is transmitted south through the Williston and Kelly Lake substations. Located approximately 330 km apart, the power transfer between these two substations is primarily carried by two 500 kV transmission lines. A parallel single 230 kV transmission line serves the local load centres. The planned project is for an additional 500 kV single circuit line to be constructed adjacent to the existing 500 kV circuits, utilizing a single corridor.

B-I-3 RIGHT OF WAY STATUS

Right of way has been acquired for three 500 kV lines between the GMS Generating Station and the Lower Mainland. Between GMS Generating Station and Williston Substation, the three 500 kV circuits have already been constructed and the subject represents the continuation of this three line transmission system to Kelly Lake Substation near Clinton.

During design and construction of the two existing 500 kV circuits between Williston and Kelly Lake Substations, terrain conditions necessitated tower locations which encroached on the right of way allocated for the third circuit. As a result, minor widening strips

will have to be acquired in certain sections. Apart from the widening strips, two parcels of land within this right of way (third circuit only) were not previously acquired because of disagreements on price. Acquisition of these two parcels as well as the widening strips is in progress.

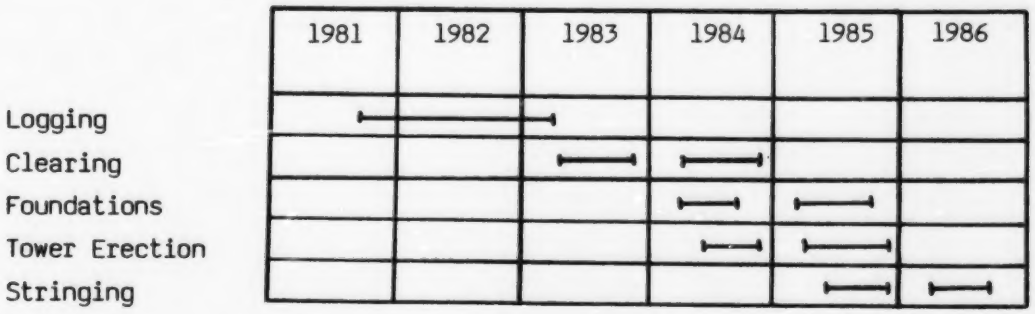
Approximately 95% of the right of way for this line was acquired several years ago prior to the introduction of the Environment and Land Use Act (1971). In April 1977, soon after the release of the ELUC's Guidelines for Linear Development, Hydro advised the ELUC Secretariat that this project had already passed the route investigation stage. Hydro reiterated this information to the ELUC Secretariat in August 1980 with the annual submission of transmission line projects.

Centre line surveys for the line have now been completed, and line and tower designs are in progress.

B-I-4 COST

A total budget of $159.7 million has been allocated for this project as detailed in Section B-I-7 of the Application.

B-II TIMETABLE



B-IV ENVIRONMENTAL IMPACT

There is merchantable timber on the right of way requiring a logging program as shown in the construction schedule.

There should be minimal incremental impact on the other resources since the new line will be routed adjacent to two existing 500 kV lines throughout its entire length.

No new access roads will be required for the logging, clearing and construction programs, because of the availability of the present access to the existing lines.

Preliminary route plans for the line are attached.

SECTION D - ANCILLARY APPLICATIONS

D-I Approvals, Permits or Licences required under the Pollution Control Act and Water Act

These Acts do not apply to transmission lines.

D-II Other Approvals, Permits or Licences Required

1. Necessary Orders-in-Council required under Section 21 of the B.C. Hydro and Power Authority Act for Land Acquisition.

2. Permits required under the Navigable Waters Protection Act for crossing over navigable waterways.

3. Licence to cut pursuant to the Forest Act is required prior to logging and clearing.

4. Conditional Use Authorization from the Agricultural Land Commission as required for crossing over lands designated Agricultural Land Reserve.

5. Other permits and approvals may be required by Contractors under the Pollution Control Act, Municipal Act, and municipal/regional regulations for work associated with the transmission line construction.

Attachment No. 3

B.C. HYDRO AND POWER AUTHORITY

SUMMARY OF

PROJECTIONS OF ELECTRIC GROSS LOAD REQUIREMENTS

Preface

This document is a summary of B.C. Hydro projections of electric service gross load requirements for the 11-year period 1980/81 to 1990/91 inclusive. These projections, which are revised annually to reflect changing conditions, are developed for planning purposes and should not be regarded as long-term predictions.

The projections are developed at three levels - low, probable and high - based on conservative, probable and optimistic economic outlooks.

Corporate Planning

September 1980

ELECTRIC SERVICE

1. Tables E 1 and E 2 attached summarize the electric forecast for Total B.C. Hydro (integrated plus non-integrated) through 1990/91. Three projections - a low, probable and high - have been prepared to reflect a range of economic outlooks and uncertainties. System plans will be developed on the probable projection with appropriate contingency planning for the high. Detailed operating budgets will be prepared using the probable projection. General long range financial analyses will also be prepared on the probable outlook and, if required, on the low and high. Although not included in this summary, extension of the projections in total has been made for a further ten years to 2000/01 for general planning purposes. These data will be provided upon request.

2. Table E 1 lists the current low, probable and high electric gross load projections through 1990/91. To show how these differ from last year's estimate, the September 1979 "Probable" projection is also tabulated. Comparison growth rates are indicated. All projections include annual load requirements of the West Kootenay Power and Light Co. Ltd. utility system (as estimated by W.K.P. & L.) to be met by B.C. Hydro starting in 1981/82. Also included are significant amounts of possible power to Cominco under the Kootenay Canal agreement starting in 1986/87 (as estimated by Cominco and given a probability rating of 45% to 50% by B.C. Hydro). A direct 11-year comparison of current average annual gross electric energy projections using actual 1979/80 as base and extending to 1990/91 (with last year's projections for the same period shown in brackets) shows:

	Current[1]	(1979 Estimate)
Low Projection	4.5%	(5.2%)
Probable Projection	6.1%	(6.2%)[2]
High Projection	8.2%	(8.1%)

(1) Excluding W.K.P. & L. and Cominco requirements from current projections, the growth rates for B.C. Hydro only are (last year's comparison in brackets): Low 3.9% (4.6%); Probable 5.6% (5.7%); High 7.8% (7.7%).

(2) The oft quoted 1979 Probable forecast growth rate of 5.9% was for the 11-year period starting with 1978/79 actual and extending through 1989/90.

A further comparison of the probable energy requirements in 1990/91 follows:

	1980 Probable Projection GW.h	1979 Probable Projection GW.h	Difference 1980 from 1979 GW.h	% Diff.
1990/91				
Residential	12 347	14 376	-2 029	- 14.1
General	15 366	18 216	-2 850	- 15.6
Other	1 002	1 088	- 86	- 7.9
Bulk	19 675	14 820	+4 855	+ 32.8
W.K.P. & L.	1 974	2 497	- 523	- 20.9
Cominco	850	412	+ 438	+106.3
Total Sales	51 214	51 409	- 195	- 0.4
Losses	6 366	6 691	- 325	- 4.9
Total Gross	57 580	58 100	- 520	- 0.9

The current probable projection is practically the same in total in 1990/91 as last year's probable estimate. However, the composition of category sales is substantially different. As shown in the 1990/91 comparison above, residential and general sales are each down some 15%, offset entirely by a 32% increase in bulk. Decreases and increases in West Kootenay and Cominco's requirements also balance. There are significant reasons for these changes. In line with current Government policy to promote natural gas for space heating, the proportion of new residential customers estimated to install electric heating over the forecast period has been lowered from 55% assumed last year to 34% for

this year's probable projection. This reduction includes the basic assumption that natural gas will be on Vancouver Island by 1985/86. In addition, the rate of increase in residential use per customer has been lowered somewhat to reflect more conservation. General sales are also down reflecting assumed increased gas use including natural gas on Vancouver Island, and increased conservation. Since preparation of last year's forecast in September 1979, B.C. Hydro and the Provincial Ministry of Industry and Small Business have received enquiries for bulk electric loads totalling some 7 000 MW. 3 000 MW of these were for 10 aluminum smelters; 2 000 MW for other loads greater than 100 MW including coal liquefaction; and 2 000 MW of enquiries from existing and new customers not exceeding 100 MW each. Only the latter 2 000 MW was analyzed on a probability basis for inclusion in the current probable projection and just over 900 MW (or 45% of the 2 000 MW) was included partly by named account and partly by "Other" allowance for growth. No allowance whatsoever was made for the remaining 5 000 MW in the probable projection. However, an additional 800 MW was included in the high projection to cover a combination of large industries. Realization of such potential growth will depend largely on public policy. West Kootenay Power and Light Co. Ltd. has reduced its estimates from last year also reflecting increased provision for conservation. However, Cominco has given us an estimate of its possible requirements under the Kootenay Canal agreement starting in 1986/87 which are much higher than expected. In discussion with Cominco and opting on the conservative side, the amounts requested by Cominco were approximately halved (i.e. given a probability of slightly under 50%) for inclusion in the current projections.

3. Table E 2 gives a more detailed breakdown of the probable forecast only, showing 10 years historic and 11 years forecast data by major sales categories, W.K.P. & L. and Cominco's requirements, losses and gross peak and energy requirements. The historic growth of electric gross requirements from 1969/70 has averaged 7.3% per annum, and over the past six years from 1973/74 has dropped to 5.0%. The probable forecast is at 6.1% including W.K.P. & L. and Cominco.

4. A few of the principal assumptions for the current projections follow. These will be expanded in detail in the Gross Load Requirements document mentioned in the introduction to this summary.

   (a) In general, the forecasts are consistent with the population and gross provincial product estimates presented in the June 1980 report "Long-Term Economic Outlook 1980-1990" by B.C. Hydro's Corporate Economist.

   (b) Residential accounts are related to 10-year population growths of 1.57% for the low projection; 1.95% for the probable; and 2.35% for the high. These low and probable projections are a little higher than those made last year and the high is down slightly. Growth in residential energy use per customer - particularly the non-heating component - has moderated substantially over the past three years reflecting response to price increases, conservation and possibly some slowing of growth in real personal income. However, electric space heating, particularly on Vancouver Island, is still a dominant factor in residential sales growth. On Vancouver Island where oil is the only major option, over 90% of new residential construction had electric heating installed in 1979/80. Although the trend to residential electric heating is expected to continue, current projections are based on considerably lower assumptions for space

heating additions than made last year to reflect Government policy and the assumption that natural gas will be on Vancouver Island by 1985/86. These assumptions for the total B.C. Hydro electric service area are: 14% of new additions for the low projection; 34% for the probable and 65% new plus 3% conversions of non-heating accounts for the high. Expected growth in residential use per account has been reduced from last year's forecast to recognize expected legislation covering insulation standards for new buildings; retro-fitting (re-insulating) existing dwellings; increased conservation efforts; reaction to rate increases; increased efficiencies of new appliances; and some supplemental wood and solar heating. The net effect of these assumptions for space heating saturation and use per customer results in considerably lower residential sales estimates than forecast in 1979, i.e. in 1990/91 the probable projection of 12 347 GW.h (from Table E 2) is down 14% from last year.

(c) General sales forecasts which comprise commercial and small industrial activity are related to Gross Provincial Product projections of 3% for the low; 4% for the probable and 5% for the high. These GPP projections are substantially the same as those forecast last year, which indicates no basic change in the longer term economic outlook for the Province. However, significantly more allowance has been made for industrial conservation and increased operating efficiencies. This results in lower sales projections for the general categories, i.e. 1990/91 is down some 16% from last year's estimate.

(d) As briefly mentioned above, industrial load enquiries for electric power totalling some 7 000 MW have been received by B.C. Hydro since September 1979. These enquiries were analyzed carefully and

handled in the following manner for the bulk sales probable projection.

	Broad Classification	Load Requests MW	Allowance in Probable Projection MW
(1)	Requests from existing customers and new enquiries not exceeding 100 MW each (including Northeast coal block)	2 000	400 MW by named account 520 MW by "Other" (detail of this 920 MW will be included in the detailed forecast document)
(2)	Major industries in the 100-125 MW range (glycol, electronics park, car manufacturing, etc.)	400	0
(3)	Large industrial projects (coal liquefaction, manganese nodules, Intor Fusion, zinc smelters, etc.)	1 600	0
(4)	10 Aluminum smelters	3 000	0
	Total	7 000	920 (13% probability)

An additional 800 MW was included in the high projection.

(e) The annual load requirements of West Kootenay Power and Light Co. Ltd. to be met by B.C. Hydro starting in 1981/82 are forecast by W.K.P. & L. and are included at the same amounts in the low, probable and high projections. Similarly Cominco's request for possible power starting in 1986/87 (which has been halved as previously mentioned) is also included at the same amounts in the low, probable and high.

5. The electric forecast represents gross requirements within the B.C. Hydro service area. It does not include any allowance for possible surplus power sales to the United States or Alberta. As such, the 5-year surplus sale agreement with Washington Water Power in the U.S. is not included.

6. Particularly as it may affect electric load growth on Vancouver Island, the electric projections are based on the assumption that natural gas will be available on Vancouver Island by 1985/86 although the transmission and distribution agencies are not known at this time. These will

be the subject of public hearings. A separate probable electric projection was prepared for Vancouver Island assuming natural gas is not available within the forecast period through 1990/91. Additional electric requirements under this condition total 40 MW and 140 GW.h in 1985/86 increasing to 160 MW and 630 GW.h in 1990/91. However, should natural gas be on Vancouver Island one year earlier in 1984/85, the electric load displaced by gas will still approximate 40 MW and 140 GW.h in the first year 1984/85, but increase to 190 MW and 720 GW.h in 1990/91.

B.C. HYDRO AND POWER AUTHORITY

FORECASTS OF ELECTRIC GROSS LOAD REQUIREMENTS

TOTAL B.C. HYDRO
(Including West Kootenay Power & Light Co. Ltd. load deficiencies starting in 1980/81 and Cominco Load Requests starting in 1986/87)

(Includes all losses except thermal station service at major thermal plants)

Fiscal Year	1980 Low Projection Prepared September 1980		1980 Probable Projection Prepared September 1980		1980 High Projection Prepared September 1980		1979 Probable Projection Prepared September 1979	
	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)
1979/80 (Actual)	5 231	29 913	5 231	29 913	5 231	29 913	5 231*	29 913*
1980/81	5 460	31 180	5 540	31 450	5 590	31 660	5 790	32 080
1981/82	5 930	33 750	6 040	34 160	6 200	34 980	6 270	34 820
1982/83	6 420	36 560	6 600	37 340	6 890	38 910	6 790	38 030
1983/84	6 880	39 210	7 150	40 510	7 530	42 610	7 370	41 350
1984/85	7 170	40 940	7 680	43 690	8 160	46 360	7 740	43 290
1985/86	7 370	42 070	8 090	46 010	8 690	49 400	8 150	45 310
1986/87	7 640	43 180	8 560	48 250	9 300	52 420	8 590	47 520
1987/88	7 920	45 000	9 020	51 130	10 180	57 730	9 040	49 770
1988/89	8 130	45 990	9 410	53 150	10 960	61 930	9 520	52 190
1989/90	8 380	47 080	9 830	55 170	11 810	66 380	10 050	54 810
1990/91	8 670	48 510	10 300	57 580	12 720	71 270	10 600	58 100
11 Yr. Av. Energy Growth-% (1979/80-1990/91)		4.5		6.1		8.2		6.2

* These are actual 1979/80 peak and energy requirements. The probable forecast for the year 1979/80 prepared in September 1979 was 5 390 MW and 30 320 GW.h.

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TABLE E 1

B. C. HYDRO AND POWER AUTHORITY

HISTORIC AND PROBABLE FORECAST OF ELECTRIC POWER REQUIREMENTS BY SALES CATEGORIES

Fiscal Year	Residential		Other		W.K.P. & L. Co. Ltd. Load Deficiency		Cominco[4] Load Request		Total Sales Less Bulk		Bulk Sales		Total Billed Sales		Losses & Accruals		Total Gross Requirements[1] (Including W.K.P. & L. Co. Ltd. & Cominco Requirements) Energy		Peak	
	GW·h	Annual % Growth	GW·h	Annual % Growth	GW·h	Annual % Growth	GW·h	Annual % Growth	GW·h	Annual % Growth	GW·h	Annual % Growth	GW·h	Annual % Growth	GW·h	% of Total Sales	GW·h	Annual % Growth	MW[3]	Annual % Growth
1969/70	3 664	5.0	4 718	9.4					8 382	7.5	5 062	11.4	13 444	8.9	1 407	10.5	14 851	9.2	2 716	6.2
70/71	4 044	10.4	5 041	6.8					9 085	8.4	5 278	4.3	14 363	6.8	1 666	11.6	16 029	7.9	2 972	9.4
71/72	4 465	10.4	5 863	16.3					10 328	13.7	5 860	11.0	16 188	12.7	1 684	10.4	17 872	11.5	3 150	5.3
72/73	4 739	6.1	6 112	4.2					10 851	5.1	7 066	20.6	17 917	10.7	2 366	13.2	20 283	13.5	3 653	16.7
73/74	5 176	9.2	6 848	12.0					12 024	10.8	7 776	10.0	19 800	10.5	2 493	12.6	22 293	9.9	3 759	2.9
74/75	5 685	9.8	7 180	4.8					12 865	7.0	7 714	-0.8	20 579	3.9	2 775	13.5	23 354	4.8	3 957	5.8
75/76	6 258	10.1	7 594	5.8					13 852	7.7	6 808[2]	-11.7	20 660	0.4	2 765	13.4	23 425	0.3	4 232	6.9
76/77	6 625	5.9	8 133	7.1					14 758	6.5	8 166	19.9	22 924	11.0	3 034	13.2	25 958	10.8	4 421	4.5
77/78	7 051	6.4	8 634	6.2					15 685	6.3	8 479	3.8	24 164	5.4	3 328	13.8	27 492	5.9	4 800	8.6
78/79	7 492	6.3	9 095	5.3					16 587	5.8	9 133	7.7	25 720	6.4	3 584	13.9	29 304	6.6	5 122	6.7
79/80	7 727	3.1	9 574	5.3					17 301	4.3	9 217	0.9	26 518	3.1	3 395	12.8	29 913	2.1	5 231	2.1
10 Yr. Average % 1969/70 - 1979/80	7.7		7.3						7.5		6.2		7.0				7.3		6.8	
Forecast																				
1980/81	8 009	4.4	10 063	5.1	-		-		18 132	4.8	9 600	4.2	27 752	4.6	3 718	13.4	31 450	5.1	5 540	5.9
81/82	8 365	3.7	10 549	4.8	176		-		19 090	5.3	11 080	15.4	30 170	8.8	3 990	13.2	34 160	8.6	6 040	9.0
82/83	8 688	3.9	11 007	4.3	331	88.1	-		20 026	4.9	13 025	17.6	33 051	9.5	4 289	13.0	37 340	9.3	6 600	9.3
83/84	9 107	4.8	11 545	4.9	555	67.7	-		21 207	5.9	14 710	12.9	35 917	8.7	4 593	12.8	40 510	8.5	7 150	8.3
84/85	9 561	5.0	12 127	5.0	911	64.1	-		22 599	6.6	16 185	10.0	38 784	8.0	4 906	12.6	43 690	7.8	7 680	7.4
85/86	9 988	4.5	12 690	4.6	1 061	16.5	-		23 759	5.0	17 135	5.9	40 874	5.4	5 136	12.6	46 010	5.3	8 090	5.3
86/87	10 424	4.4	13 314	4.9	1 215	14.5	120		25 073	5.6	17 800	3.9	42 873	4.9	5 377	12.5	48 250	4.9	8 560	5.8
87/88	10 877	4.3	14 018	5.3	1 545	27.2	270	-	26 710	6.5	18 775	5.5	45 485	6.1	5 645	12.4	51 130	6.0	9 020	5.4
88/89	11 352	4.4	14 759	5.3	1 691	9.4	300	11.1	28 105	5.2	19 166	2.1	47 265	3.9	5 885	12.5	53 150	4.0	9 410	4.3
89/90	11 846	4.3	15 544	5.3	1 830	8.2	450	50.0	29 670	5.6	19 405	1.3	49 075	3.8	6 095	12.4	55 170	3.8	9 830	4.5
1990/91	12 347	4.2	16 368	5.3	1 974	7.9	850	88.9	31 539	6.3	19 675	1.4	51 214	4.4	6 366	12.4	57 580	4.4	10 300	4.8
11 Yr. Average % 1979/80 - 1990/91	4.4		5.0						5.6		7.1		6.2				6.1		6.4	

Notes: (1) Excludes Thermal Station Service at Burrard, Ft. Nelson, Georgia, Keogh and Prince Rupert.
(2) Bulk sales in 19/5/76 abnormally depressed by approximately 1400 GW·h as a direct result of 3 months pulp and paper strike.
(3) Forecast peak loads are based on normal weather conditions.
(4) Cominco has requested possible amounts of power which are approximately twice the amounts tabulated here. For this projection and in discussion with Cominco the Company's possible requirements were given a probability of slightly under fifty percent.

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CHART E 1

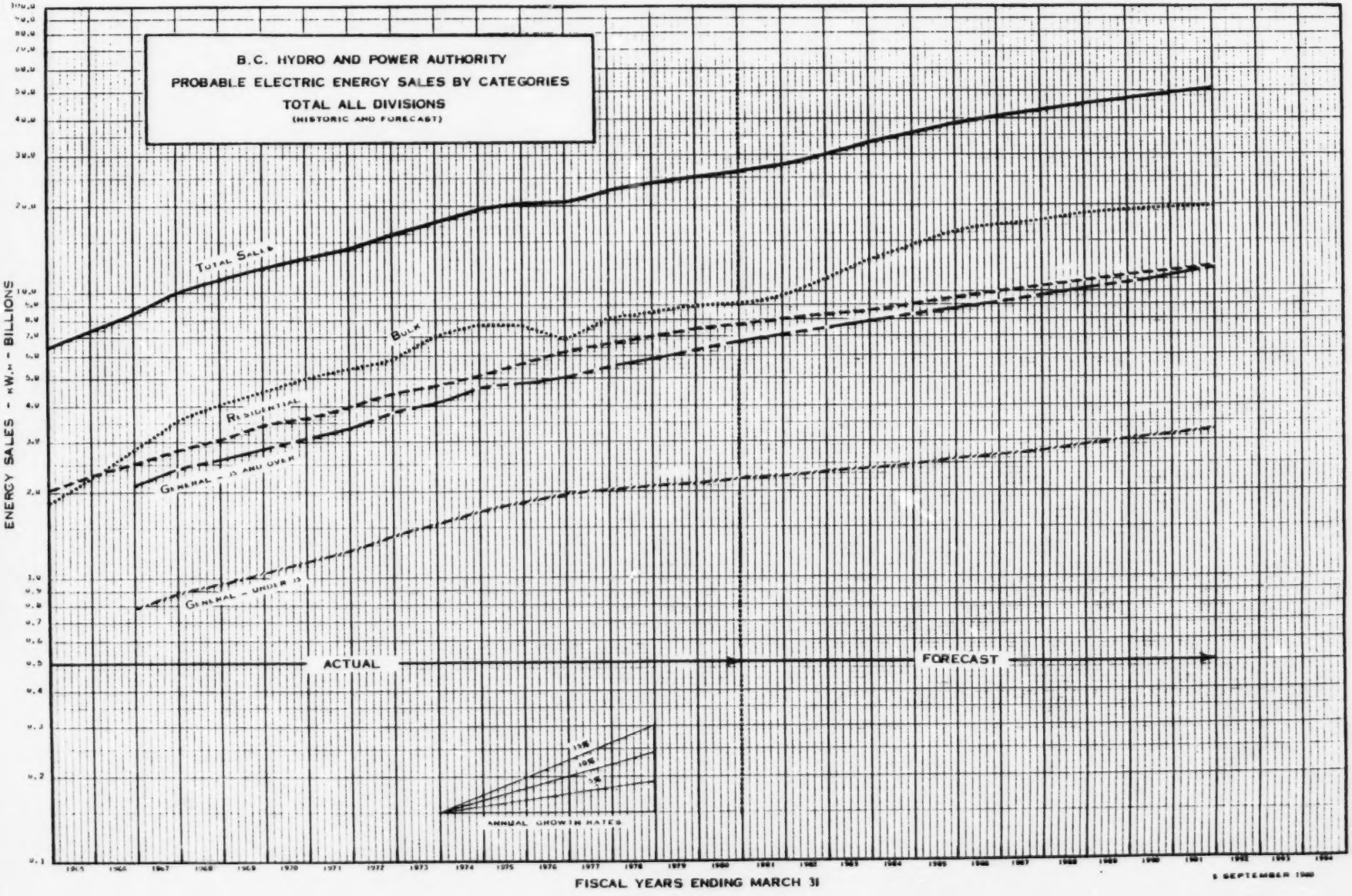

CHART E 1

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